

**REMARKS**

In this response, Applicants have amended claims 8 and 13. Support for the additional limitations added to claims 8 and 13 can be found at page 14, lines 10-23 of the specification as originally-filed. Following entry of these amendments, claims 8-10 and 13 are pending in the application.

**Rejection Under 35 U.S.C. § 112, First Paragraph**

Claims 8-10 and 13 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claims 8 and 13 have been amended, thus respectfully overcoming the rejections thereto.

**Rejection Under 35 U.S.C. § 102**

Claims 8-10 and 13 stand rejected under 35 U.S.C. § 102(b) as being anticipated by JP 07-01346 to Mizuno (“Mizuno”). Applicants respectfully requests reconsideration of the present application in view of the foregoing amendments and the remarks that follow.

Claims 8 and 13 are independent claims. Claims 8 and 13 have been amended to further clarify the invention as claimed. The purpose of the present invention is to improve a thermal durability of an electrolytic membrane by equalizing a temperature distribution of the electrolytic membrane. The boundary layer of the present invention is formed by closing up the conductive particles adhered together to which a hydrophilic treatment is carried out, whereby more water generated by electrochemical reaction can be held in the boundary layer. This increases heat conductivity of the boundary layer. An increase of the electrochemical reaction of un-reacted gases results in the border vicinity of the boundary layer. Further, heat generated in the border vicinity of the catalyst layer adjacent to the boundary layer escapes to the boundary layer containing the water. Mizuno fails to disclose these characteristics.

More specifically, in the claimed invention, when the hydrophilic treatment is carried out to the conductive particles (4) in the boundary layer (3C), water is generated on the cathode side by the electrochemical reaction. A part of this water passing through the electrolytic membrane (1) to the anode side can be held inside the boundary layer (3C). As a result, heat conductivity of the boundary layer (3C) containing the water is increased. Further, in the border vicinity of the catalyst layer (2) adjacent to the boundary layer (3C), the

un-reacted gases cause an increase in the electrochemical reaction. Additionally, heat generated in the border vicinity tends to escape to the boundary layer (3C), which has a lower temperature.

As a result, the temperature, which tends to increase in the border vicinity, is more rapidly diffused. This helps to equalize the temperature distribution of the electrolytic membrane (1) and to improve durability of the electrolytic membrane (1). Water in the boundary layer (3C) tends to restrict the passing of the un-reacted hydrogen gases through the boundary layer (3C). This prevents combustion reaction of the oxygen and the hydrogen occurring when the hydrogen components move to the cathode side of the electrolytic membrane (1) through the boundary layer (3C), to avoid heat deterioration of the electrolytic membrane (1) (see page 14 lines 10 – 29 in the specification). The purpose of the present invention is to improve a thermal durability of an electrolytic membrane by equalizing the temperature distribution of the electrolytic membrane.

On the other hand, Mizuno does not talk about any of these characteristics, largely due to its “fireproof layer.” Specifically, the fuel cell of Mizuno has a fireproof layer – a carbonized layer having no catalyst. The reaction between oxygen and hydrogen is restricted in the fireproof layer. As a result, the temperature in the vicinity of the fireproof layer is decreased. Further, un-reacted hydrogen gases increase in the vicinity of the fireproof layer and the un-reacted gases then generate the electrochemical reaction in the vicinity of a boundary to a catalyst layer adjacent to the fireproof layer, which causes a temperature increase in a local part of an electrolytic membrane.

Mizuno discloses that a heat generated around a catalyst layer (14) is prevented from conducting directly to a electrolytic membrane (10) by carbon particles in a fireproof layer (16). The carbon particles of the fireproof layer (16) does not carry a platinum catalyst, so the fireproof layer does not conduct the heat to the electrolytic membrane (10) which improves the thermal durability of the electrolytic membrane (10). (See paragraph [0034].) However, the fireproof layer (16) stops the conducting of heat from the catalyst layer (14) and temperature at a border vicinity between the catalyst layer (14) and the fireproof layer (16) is raised locally. This cause heat deterioration of the electrolytic membrane (10), because the fireproof layer (16) can not diffuse the heat well generated at the border adjacent to the catalyst layer (14).

In summary, Applicants believe that claims 8 and 13 are distinguishable from Mizuno.

**Conclusion**

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.b

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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